

ABSTRACT

Regeneration Mechanism of Mandibular Cartilage Defect using human Umbilical Cord Mesenchymal Stem Cell and Platelet Rich Fibrin Scaffold**Ni Putu Mira Sumarta**

Mandibular cartilage is a fibrocartilage tissue, as well as other articular cartilage have a limited regenerative capacity. Various technique that had been developed previously did not provide satisfying long term result. The advantage of *human umbilical cord mesenchymal stem cell* such as ability to differentiated into osteogenic, adipogenic, and chondrogenic lineage, made hUCMSC a choice treatment in cartilage regeneration, however its regenerative mechanisms has not yet been understood. The aim of this study was to describe the mechanism of mandibular cartilage regeneration with implantation of hUCMSC over PRF scaffold. Twenty *Rattus novergicus* were divided into 4 groups: 1 control group and 3 experimental groups. First experimental group was implantation of hUCMSC on mandibular cartilage defect, second experimental group was implantation of PRF, and third experimental group was implantation of hUCMSC over PRF scaffold. After 6 weeks of observation, 20 experimental animal were sacrificed for histopatology and immunohistochemisty staining. Expression of FGF 18, Sox 9, Ki67, chondrocyte counts, type II collagen, aggrecan, and cartilage thickness were analyzed. Expression of FGF 18, Sox 9, Ki67, chondrocyte counts, type II collagen, aggrecan, and cartilage thickness were significantly higher ini hUCMSC over PRF scaffold group showed that PRF as scaffold support chondrocyte differentiation of hUCMSC and the differentiated chondrocyte were able to form cartilage matrix in mandibular cartilage regeneration. Different pathway involved in mandibular cartilage thickness increase in each group. Regeneration of mandibular cartilage with implantation of hUCMSC over PRF scaffold established through increasing expresssion of FGF 18 that upregulated Sox 9 expression, enhanced chondocyte differentiation of hUCMSC, thus the differentiated chondrocyte formed extracellular matrix such as type II collagen and aggrecan that form mandibular cartilage thickness.

Keywords: human umbilical cord mesenchymal stem cell, platelet rich fibrin, mandibular cartilage defect, mandibular cartilage regeneration.